her displacement by projecting or withdrawing telescopic chambers in her sides, instead of pumping water into or out of ballast tanks, the method usually followed in similar boats. The boat is spindle-shaped, 60 feet long and 8 feet in diameter amidships, built of ⅝-inch steel, and is propelled by an electric motor of 45 horse-power, current being furnished by storage batteries.

LETTERS TO THE EDITOR.

***Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

Popular science.

IT is often very popular indeed. Here is an article on the voices of animals by Detler von Geyern (whoever he is), from *Ueber Land und Meer*, translated for the *Popular science monthly*, January, 1887, written in the good old traditional vein, quoting what anybody has said on the subject in a wonder-mongering way, as if every thing said and written must be true. And Herr von Geyern himself says, "Fish can produce no sound in water, because air is lacking as a medium to propagate the waves of sound; and yet we incline to the belief that water itself may admit of forming some kind of sound-waves which the fish may be capable of exciting, and which will be experienced and comprehended by other fish;" and he adds, "As far as we are concerned, of course, fish will remain mute," etc. — as if between fifty and a hundred species of fish are not known to make sounds, many of which have been described and explained by naturalists; and as if water and every other elastic medium were not well known as propagators of sound, often better than air, — a fact familiar to boys, who hold their heads under water, while bathing, to hear the loud sound made by the striking-together of two stones under water in the hands of a companion at a little distance. H. W. P.

Grinnell, Io., Jan. 14.

The natural method of language-teaching.

I read with much pleasure the recent article of Professor Carpenter on the natural method of teaching languages. Such articles are in the direct interest of truth, and therefore of science; for the more the claims and achievements of the teachers of these methods are scrutinized, the more evident their weakness becomes. Every intelligent teacher knows that there is little if any thing really new in any of these methods, and every good teacher of languages has employed several, if not all, of their varieties and sub-varieties, each of which is superior to the others in the opinion of their self-styled inventors. We are safe in assuming that the natural method of learning a foreign language is at least as old as the time of Cain, for it is both probable that he learned the language of the people of Nod, and that he used neither grammar nor dictionary.

I believe, that, in the main, great improvements have been made recently in the teaching of languages, but not greater than, or even so great as, in the natural and physical sciences, as they are commonly called. For some reason the teachers of the last two have either been more modest in proclaiming their progress, or they have been more generally aware that they are only employing methods that the best teachers in these departments, as in all others, have been using to a greater or less extent ever since the birth of science.

Several years ago I took considerable pains to examine, both at first-hand and at second-hand, the claims of several of the most widely known teachers of natural methods as applied to foreign languages. I then made some statements that agree almost verbatim with those made by Professor Carpenter. In spite of the well-established fact of every-day experience, that the adult is able to retrace but very imperfectly the psychological experiences of his early years, we are told that all persons, no matter how old, should, if desirous of learning a foreign language, proceed exactly in the same way that they learned their mother-tongue. This is the inductive method run riot, while experience and generalization count for nothing. To me the best refutation of the claims of most teachers of natural methods lies in the fact, that, while professing to be able to teach us to "read, write, and speak their vernacular correctly in an incredibly short time," I have not yet found one or heard of one who spoke English more than passably, even after years of practice. Shall we say, 'Physician, heal thyself'? or shall we excuse their shortcomings for the reason that 'physicians never take their own prescriptions'? CHAS. W. SUPER.

Athens, O., Jan. 16.

Stereoscopic vision.

The letters in the last two numbers of *Science* (ix. Nos. 204, 205) in relation to stereoscopic vision lead me to ask if any of your readers have ever tried the experiment of viewing a stereoscopic picture with the naked eye, and, by changing the focal distance, or visual angle of the eyes, so adjusting them, while looking at the picture, or, more properly, the two pictures, that the full stereoscopic effect is produced, and all parts of the picture stand out distinct, and in as bold relief as when seen through the two glasses. The first effect of the change of the visual angle, from the paper on which the pictures are imprinted to a more distant range of vision, is to double the number of the pictures, four now coming into view, The two inner ones overlap more or less, and slide over each other to right and left, as the visual angle undergoes alteration, until finally, when the proper adjustment is reached, the two pictures coincide in all their parts, coalescing, as it were, like two drops of water or two globules of quicksilver when they meet and run together. And now there are three pictures in view, and the eyes may be turned about from one point to another, and any part or particular object in the picture minutely inspected in any one of the three copies. The central picture is the most clear and distinct, being held in view by both eyes, while the two outer ones are respectively visible to only one eye. W. W. ANDERSON, M.D.

Statesburg, S.C., Jan. 13.

An electric ball of fire.

In the summer of 1881 it was my good fortune to observe some electrical phenomena in the way of 'globular lightning,' which differ, I think, in some respects, from any other case on record. It consisted of a ball of fire which rolled down an iron water-

pipe, which pipe enters the room at a height of about ten feet, and, passing downward, ends in a faucet over a zinc-lined sink, the sink being connected by a pipe with the ground. The ball of fire was about an inch and a half in diameter, of a semi-transparent bluish color, giving a feeble light, which first appeared at the top of the pipe, and rolled down it at a nearly uniform velocity of six or eight feet per second, and, upon reaching the faucet, fell into the sink with a report about as loud as the discharge of a gun-cap. We at once examined the sink, but found no trace of any thing. But, as we stood watching the pipe, the same phenomenon was twice repeated, making three discharges in the course of ten minutes.

This occurring, as it did, five years and a half ago, I am unable to give as accurate an account as I might wish. There were twelve or fifteen persons in the room at the time, some of whom I have since seen, and all agree. In regard to the location, it was in the Sunset Hill house on Sugar Hill, in the White Mountains, about seventeen hundred feet above the sea. The pipe which supplies water to the house comes from a spring on the mountain-side, and, passing up through the wall, leads to a reservoir on the roof of the kitchen.

The pipe on which the globular lightning was seen is a branch of this main pipe. On its way to the upper story — starting from a height of about ten feet, it comes out of the wall, and passes downward at an angle of about 30° with the vertical, ending in a brass faucet over the sink. The pipe was of wrought iron, covered inside and out with a coating of coal-tar to prevent rusting.

The phenomena described occurred during a heavy thunder-storm, and, so far as I can learn, nothing of the kind had ever happened there before, nor has it even been repeated. N. C. WARDWELL.

Hartford, Jan. 10.

The genesis of the diamond.

In an interesting communication under this title, Prof. H. Carvill Lewis gives in No. 193 of *Science* an apparently satisfactory theory of the structure and origin of the diamond-bearing necks of South Africa and of the genesis of the gem in that region. The discovery of undecomposed peridotite as the original form of the puzzling blue ground confirms the suspicion long entertained by my friend, Prof. Henri Goraix, and myself, that very slight analogies, if any, exist between the South African and Brazilian diamond-fields, in the latter of which we have, as we think, traced the diamond to its original matrix. Communications on the subject will be found in the *American journal of science* for February and July, 1882, by myself, and in papers by Professor Goraix in the *Comptes rendus de l'académie des sciences* and *Bulletin de la Société géologique de France* of 1884.

The main points of these papers may be briefly summarized as follows. The diamond region about the city of Diamantina, in the province of Minas-Geraes (the oldest and best-known diamond-field of Brazil), consists geologically of very ancient and profoundly disturbed metamorphosed strata, which may be divided into three groups: 1°, wholly crystalline rocks, gneiss, mica-schists, etc.; 2°, less perfectly crystalline rocks, unctuous schists, quartzites (itacolumites), iron ores (itabirites), and limestones; and, 3°, quartzites. The first two groups form the nucleus of the mountainous diamond-bearing region, No. 2 greatly predominating over No. 1. No. 3, which in hand specimens (and often in the field as well) can only with difficulty be distinguished from the quartzite of group 2, with which it has up to the present been very generally confounded, lies in undulating folds over the upturned edges of Nos. 1 and 2, and at times passes to a conglomerate including fragments of both the older groups. The geological age of these groups is undetermined, but the newest of them can scarcely be younger than the Silurian, and, if not older, belongs more probably to the earlier than to the later part of that age. The eruptive rocks thus far recognized in the diamond district are granites, diabases, gabbros, and serpentinous rocks, which very probably were originally peridotites. It should be remarked, however, that the latter are apparently far less abundant than in the region farther south in the same mountain-range, in which diamonds are only found rarely, or, over large areas, not at all.

The greater part of the diamond-washing, being in river-alluviums or in gravel-deposits on the uplands, gives no clew as to which of the three groups or of the associated eruptions may have furnished the gems. A few of the upland gravel-deposits are evidently decomposed but undisturbed conglomerates belonging to group 3. The famous Grao Mogol locality described by Helmreichen, Claussen, and Heusser and Clary, where diamonds are found embedded in a hard quartzite with a conglomeritic character, belongs also, in my opinion, to this group; the diamond entering, like the other elements, as a rolled pebble. Professor Goraix, however, who has had the advantage of a personal examination of the locality, refers the diamantiferous rock to the quartzites of group 2, and admits the possibility of the genesis of the gem *in situ*, though he does not insist very strongly on this point. The difficulty I have often experienced in distinguishing the quartzites of the two groups one from the other, even when they are in juxtaposition in the same section (as I believe Professor Goraix admits them to be at Grao Mogol), leads me to the apparent presumptuousness of maintaining my opinion against that of so acute and conscientious an observer.

At a single locality, Sao Joao da Chapada, the miners have penetrated deeply the decomposed but undisturbed schists of group 2, extracting the diamond from a decomposed vein-rock from which Professor Goraix took out, with his own hands and with all possible precaution against error, several of the precious stones, after I had expressed to him the opinion that it was the veritable matrix of the diamond. Three veins of somewhat different character have been recognized. One is of quartz with plates of specular iron, to which the diamantiferous *barso* (clay) adheres. This last is an earthy mass rich in iron, which gives, on washing, an abundance of microscopic tourmaline. This last circumstance, with the abundance of iron, suggests a comparison with the peculiar auriferous veins of quartz, pyrites, and tourmaline of the vicinity of Ouro Preto in the same geological horizon, and in very similar conditions. The other veins are without quartz, and consist of a lithomarge-like clay charged with oxides of iron and manganese, which, as Professor Goraix states, bear a strong resemblance, both in composition and geological occurrence, to the topaz and euclase bearing viens of the vicinity of Ouro Preto. These veins are coincident with the